Blizzard Morbidity and Mortality: Rhode Island, 1978

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Abstract: The total number of outpatient visits to 10 hospital emergency rooms declined 64 per cent and emergency admissions 35 per cent immediately after the February 1978 blizzard in Rhode Island; both quickly returned to normal levels. Three days after the storm, admissions for myocardial infarction increased markedly. Total mortality and ischemic heart disease deaths showed a considerable increase for the five-day period following the blizzard. The physical and psychological stress of the blizzard probably precipitated cardiac deaths in susceptible individuals. (*Am J Public Health* 69:1050-1052, 1979.)

Introduction

In February 1978, a severe blizzard struck southern New England. Up to 50 inches of snow accumulated over a 24-hour period beginning at noon on February 6. The snow blocked roads and rail lines, closed airports, and stranded millions of persons away from their homes, and on February 8 Rhode Island was declared a federal emergency area. Most travel in the state was entirely closed down for a four-day period, and normal traffic circulation did not resume for a week. Virtually all outpatient medical facilities except those affiliated with hospitals and one dialysis center were closed for the week.

This paper discusses the morbidity and mortality associated with the blizzard. Such information should be of value in planning for disaster preparedness and assistance in the future.

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Editor's Note: See related article p. 1047.

Methods

To assess morbidity, a survey of all emergency rooms at the nine hospitals in the central and northern parts of the state and one hospital in the southern part of the state was conducted. Only one hospital-based emergency room, located in the southeastern section of the state, was not included in the survey because this area received a lighter snowfall than the rest of the state. All emergency outpatient and admission diagnoses for the storm period and for the seven-day period prior to the storm were tabulated in diagnostic categories that might relate to the blizzard, such as orthopedic injuries and myocardial infarctions.

Analysis of statewide mortality was based on review of the medical examiner's log and vital statistics information for February 1978 and for the previous five-year period.

Results

Emergency Room Outpatient Visits

During the week prior to the storm, a daily average of 594 outpatient emergency room visits were made to the ten surveyed hospitals. Of these, 50 per cent were for orthopedic and other traumatic injuries and 9 per cent were for respiratory infections. The day following the storm, February 7, emergency room visits declined markedly to 195 (a 64 per cent reduction) and then rebounded to normal levels three days later (Table 1). Excepting the small number of psychiatric diagnoses, decreases occurred in every diagnostic category examined. Orthopedic and other traumatic injuries showed a greater decline (73 per cent) than other categories. Five patients were treated for carbon monoxide poisoning during the blizzard period as compared to one patient in the week prior to the blizzard. Visits for frostbite increased from

TABLE 1—Average Number of Daily Emergency Room Outpatient Visits by Primary Diagnostic Category*, in 10 Rhode Island Hospitals, during Pre-Blizzard Period (Jan. 30–Feb. 5) and Blizzard Period (Feb. 6–11), 1978

Date	Orthopedic Injuries	Other Trauma	Psych.**	Uri*** & Pneumonia	All Other	Total
Jan. 30–Feb. 5	121	177	15	54	227	594
Feb. 6	94	109	8	38	171	420
Feb. 7	39	42	16	21	73	195
Feb. 8	72	98	18	40	164	392
Feb. 9	99	107	14	60	221	501
Feb. 10	114	129	15	57	242	557
Feb. 11	107	122	19	73	266	587

*excludes those admitted
**psychiatric (including drug overdose)
***upper respiratory tract infection

a pre-storm average of 1.6 per day to 5 per day one week after the blizzard.

Emergency Admissions

While some decline in emergency admissions occurred following the storm, it was not as great as that for emergency room visits. The day following the storm, there were 71 emergency admissions compared to 110.4 for the period prior to this storm (a 35 per cent reduction). Most of this was due to a decline in admissions for non-orthopedic trauma and the "other" category of diagnoses (Table 2). By the third day after the storm, admissions had returned to normal levels. A marked increase to 28 admissions for myocardial infarction were seen on the third and fourth post-storm days compared to a pre-storm figure of 17.6.

Mortality Analysis

The medical examiner listed 20 deaths during the period from February 6 to February 11 as being storm-related. One of these was due to a sledding accident, two were carbon monoxide poisoning, and the remaining 17 were represented sudden non-traumatic death occuring out-of-doors. Of these latter 17, only nine (53 per cent) had a known history of ischemic heart disease.

On the day of the storm, there was an increase from an average of 2 to 11 hospital emergency admissions labeled dead-on-arrival (DOA) (Table 2). This may be related to the fact that funeral directors and physicians could not reach the scene of death and emergency crews brought bodies to emergency rooms to be pronounced legally dead.

Mortality showed a marked increase for the day of the storm and for three of the five subsequent days. The average number of deaths per day for February from 1973 to 1977 was 27. The day of the storm there were 48 deaths; for February 7–11 the figures were 32, 38, 24, 26, and 38. (Figure 1). The total observed number of deaths for the period from February 6 to 11 in 1978 was significantly different from that expected for the same period based on the preceding years (chi-square, $p < .005$). Most of the increase in deaths was accounted for by an increase in ischemic heart disease deaths during this period above that expected from the five previous years (chi-square, $p < .005$). Where the average daily number of cardiac deaths was 11 in the preceding years for the month of February, the observed number on February 6 was 24.

Discussion

Several morbidity and mortality aspects of the February 1978 blizzard are of interest. Emergency room visits declined markedly for several days following the storm probably because access was difficult. While emergency admissions also declined during this period, the decline was not nearly as great as that seen for emergency room visits. This might imply that most true emergency patients were able to reach the hospital by special means of transportation that included helicopters. A diminution in the number of visits for minor respiratory infections and an actual reduction in the occurrence of minor orthopedic and other traumatic injuries

TABLE 2—Average Number of Daily Admissions from Emergency Rooms by Primary Diagnostic Category-10 Hospitals, during Pre-Blizzard Period (Jan. 30–Feb. 5) and Blizzard Period (Feb. 6–11), 1978

Date	Orthopedic Injuries	Other Trauma	MI*	DOA**	Psych***	Pneumonia	All Other	Total
Jan. 30–Feb. 5	9	11	18	2	3	5	63	111
Feb. 6	6	4	14	11	1	4	54	94
Feb. 7	10	2	13	2	0	7	37	71
Feb. 8	7	2	18	0	8	7	56	98
Feb. 9	7	5	28	1	3	10	65	119
Feb. 10	11	3	28	3	4	5	71	125
Feb. 11	8	9	14	6	1	3	55	96

*myocardial infarction
**dead on arrival
***psychiatric (including drug overdose)

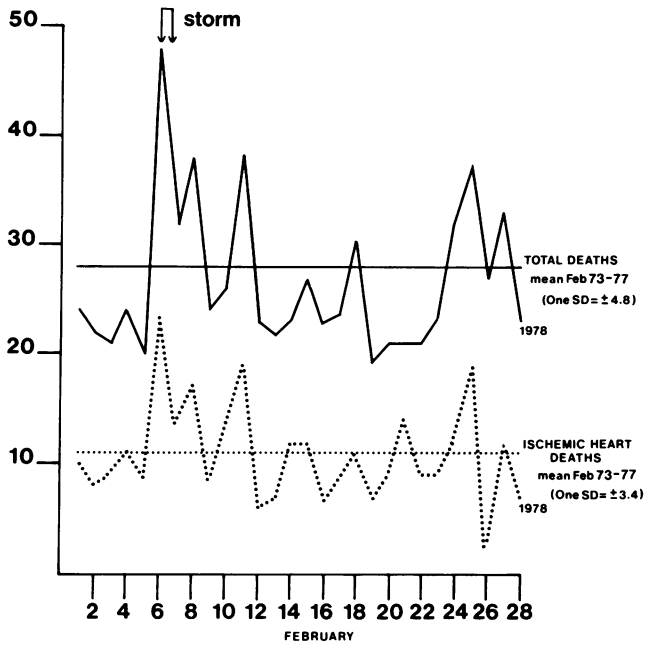

FIGURE 1—Daily Total and Ischemic Heart Deaths, Rhode Island, February 1978 and Mean 1973–77*

*Source: R.I. Division of Vital Statistics

because people stayed in their homes probably contributed to the storm's differential effect on visits and admissions.

The tallying by medical examiners of storm-related deaths without reference to the expected number of ischemic heart disease deaths has previously been questioned.[1] The 1978 Rhode Island experience suggests that ischemic heart disease deaths did increase for several days above expected levels after the storm. The transient increase in ischemic heart deaths associated with the blizzard was almost certainly due to an increase in physical and psychological stress. A key question is how much of this stress was avoidable for susceptible individuals. Linked to this are questions about the value of traditional warnings against overexertion.[2] For those without known cardiac disease, the need to shovel paths and to move trapped automobiles is likely to outweigh any cautionary warnings. Even for known cardiac patients, stress may be unavoidable. To answer these questions a detailed analysis of the medical history, circumstances of death, attitudes and effect of warnings on blizzard victims and nonvictims would have to be undertaken.

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Cohort Maternal Mortality: New York, 1917–1972

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Abstract: Data on New York State maternal mortality, 1917–1972, are analyzed and show that the cohort patterns of age-specific maternal mortality are mainly a reflection of the pattern of period declines in age-specific maternal mortality. (*Am J Public Health* 69:1052–1055, 1979.)

In his article on cohort tuberculosis mortality, Springett[1] discussed various theoretical types of decline in mortality for cohort mortality patterns. He defined three types of mortality decline: 1) Those which occur in equal relative amounts at all ages in the same cohort; 2) Those which occur in equal relative amounts at all ages in the same time period; and 3) Those which affect some ages to a greater extent than others. This paper attempts to describe the cohort patterns of the New York State maternal mortality and determine if the decline in mortality for cohort mortality patterns which Springett observed is also present in the New York State cohort maternal mortality. Data on New York State maternal deaths by age and on live births by mother's age for the years 1917 through 1972 were used to obtain age-specific, cohort-specific maternal mortality rates for the birth cohorts of 1898–1902 to 1928–1932.

Findings

Between 1917 and 1935, maternal mortality rates of New York State fluctuated between 700 and 500 per 100,000 live births, but no clear trend was discernible. Rates in-

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